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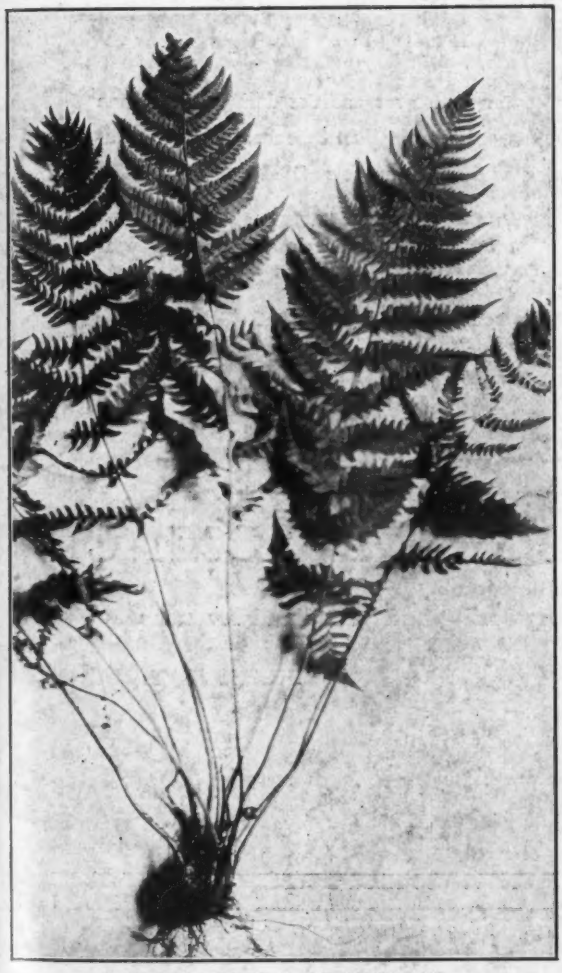

DRYOPTERIS MARGINALIS
now recognized as one of the sources of
Aspidium U. S. P. XII (see article, p. 126)

APRIL
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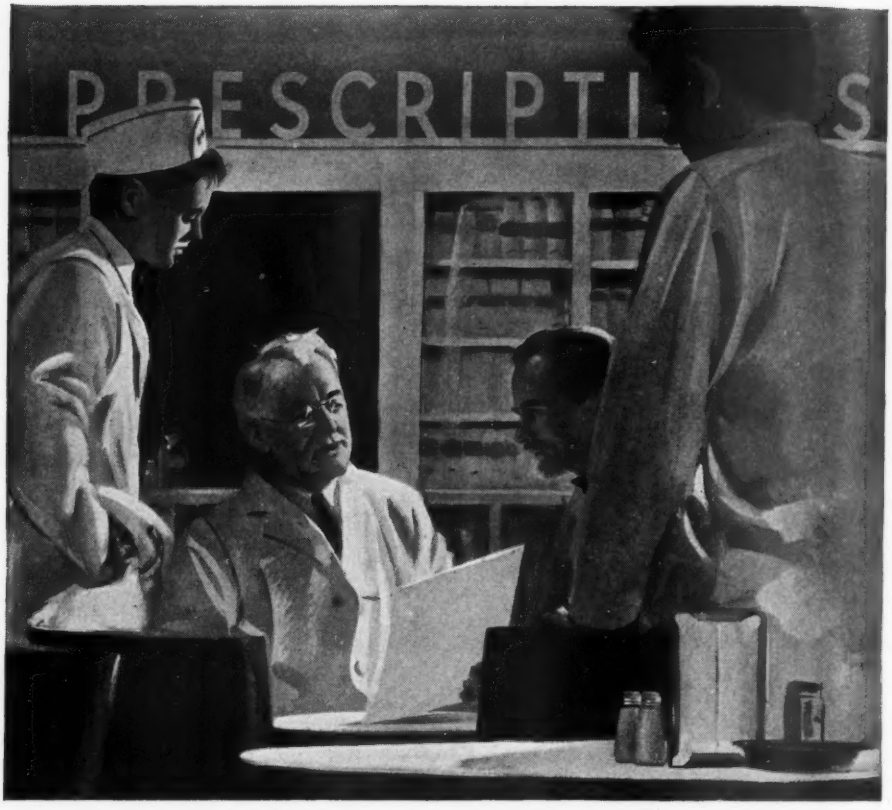

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Vol. 115. APRIL, 1943 No. 4

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(Cover illustration from *Youngken's Textbook of Pharmacognosy*, Courtesy of The Blakiston Company.)

Published monthly by the Philadelphia College of Pharmacy and Science 43rd Street, Kingsessing and Woodland Avenues, Philadelphia, Pa.

Annual Subscription, $3.00 **Foreign Postage, 25 Cents Extra**
Single Numbers, 30 Cents **Back Numbers, 50 Cents**

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa. Under Act of March 3, 1879

Acceptance for Mailing at Special Rate of Postage Provided for in Section 1103 Act of October 3, 1917. Authorized February 15, 1920

EDITORIAL

WHO IS RESPONSIBLE?

IT has long been apparent to those familiar with the manpower problem in pharmacy that sooner or later some serious situations would arise which would sorely tax the moral and professional integrity of certain divisions of organized pharmacy. Not so long ago an editorial entitled "We Must Maintain Our Standards" gave warning that we might expect to see groups, interested solely in obtaining low cost personnel for retail establishments, attempt to lower the requirements of retail store operation by legislation designed for this purpose. There have been introduced recently in the legislatures of several states a number of bills calculated to do just this. For example, one bill would automatically register as a pharmacist any qualified assistant who has been engaged in retail practice for ten years; another would legalize the operation of a drug store with a pharmacist in attendance only part time.

Terms such as "for the duration only" or "as an emergency measure" are adroitly introduced in order, in some way, to make it appear that these changes should be endorsed as a patriotic gesture but, once incorporated in law, their true significance would slowly unfold.

More and more of such vicious attempts to destroy our profession may be expected as the pressure becomes more intense and it is necessary to either lower standards or concentrate on professional work.

Let us examine who is responsible for such legislation being introduced. Is it the public? The answer seems unmistakably—No! As yet, no essential pharmaceutical service has been unobtainable, although some little delay and inconvenience is unavoidable under present world conditions.

Is it the individual pharmacist? The answer to this is clearly, Absolutely not! No pharmacist would willfully advocate legislation placing him on a par with a half-educated apprentice and thus damage both his own professional status, his educational investment and economic future.

Who then makes the representations to the lawmakers resulting in such monstrous legislative proposals? There seems but one likely

answer; those retail groups to whom a college diploma and professional licensure mean nothing but another man whom they can place in one of their own establishments to exploit and manipulate solely for profit. Their interest in public welfare and professional responsibility is attested to with tongue-in-cheek. Profit and more profit is their only real interest and, if the public would stand for it, professional training as far as they are concerned could be dispensed with. To them the operation of a drug store and a grocery store are quite analogous except in the former case the legal requirement of a licensed pharmacist makes operational costs somewhat higher and, as the demand for trained men increases, their overhead costs for such personnel alarms them greatly. It would be really serious if they were forced to pay a pharmacist a salary equivalent to union wages for a carpenter or a bricklayer! It is unthinkable. If only legislation is needed to avoid such unheard of things, political pressure must be used by all means. After all what do professional standards mean when they stand in the way of dollars and cents? Not only do such standards make low-cost men hard to get but they imbue the possessor with a lot of foolish notions about the responsibility of the pharmacist in matters pertaining to public health which is contrary to their policy of doing business.

The time is rapidly approaching when real pharmacists, men with a professional perspective and ambition, must make a clean break with all those commercially-minded groups which constantly operate so as to place pharmacy at a disadvantage. The over-all picture of pharmacy today is indeed a sorry mess. It can be great and it shall be, but let's have a team where all the players are on our side and then let us set out to win our battle for proper recognition and respect without having to take time out to check the actions of those who would, for personal profit, undermine our progress and effort.

L.F.Tice.

A METHOD FOR THE DETERMINATION OF NICOTINAMIDE

By Charles F. Krewson, Ph. D.*

THE method here described for the determination of nicotinamide is essentially a modification of the recently published U. S. P. XII assay for this substance. The official method depends in principle upon the alkaline hydrolysis of nicotinamide to nicotinic acid and ammonia, with subsequent distillation of the liberated ammonia into standard acid. According to the modified method, the amide is hydrolyzed by strong hydrochloric acid, the acid is alkalized, and the liberated ammonia distilled into standard acid. This method, developed independently in this Laboratory, is more economical with respect to time, materials, and operation, and has proved satisfactory in one hundred eighty-two analyses of mixtures containing nicotinamide.

Apparatus

The apparatus used was a modification of the steam distillation equipment employed in the determination of nicotine as described by Avens and Pearce (1). The 50-ml. round-bottom flask was replaced by a 50-ml. Erlenmeyer flask, which was connected through a one-hole stopper and by means of a safety trap with a small vertical water condenser. From experience in nicotine determinations with the style of safety trap illustrated (1), it was found advisable to construct a trap with the inlet tube having an inside diameter of not less than 7 mm. If the trap has two return holes within the bulb and the proper size tubing is used, there is no build-up of liquid within the trap during distillation.

Procedure

To about 0.15 g. of nicotinamide, previously dried over sulfuric acid for eighteen hours and accurately weighed into a 50-ml. Erlenmeyer flask, was added 5 ml. of concentrated hydrochloric acid. The

* Eastern Regional Research Laboratory, Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, United States Department of Agriculture, Philadelphia, Pennsylvania.

flask was connected to a small vertical condenser, and the reaction mixture maintained at the boiling temperature for fifteen minutes.

Fifteen ml. of distilled water was added through the condenser, the condenser was removed, and a small piece of pumice and 6 ml. of a saturated aqueous solution of sodium hydroxide were added to the Erlenmeyer distilling flask. The addition of alkali was made in such a way as to prevent loss of ammonia. The flask was clamped in the inclined position required for distillation, and the alkali added so as to cause the solution to flow down the inner side of the flask to form a layer under the acid solution. After the distilling flask was shaken, about 15 ml. of distillate was collected in approximately twelve minutes. The appearance of a precipitate in the distilling flask was used as an indication that the operation was complete. The condenser and delivery tube were rinsed into the receiving flask with 5 ml. of distilled water. Five drops of methyl red, 0.1 g. in 100 ml. of 95 per cent. alcohol, were added to the liquid in the receiving flask, and the excess acid was titrated with tenth-normal sodium hydroxide. As in the U. S. P. assay, a blank test with the same quantities of reagents and in the same manner was made, and the necessary correction was applied.

Results and Discussion

For a comparison between the modified method and the U. S. P. assay, a commercial sample of nicotinamide, m. p. 129-130° C., was analyzed by both procedures. The results are shown in Table I. Another portion of the sample was analyzed after its melting point had been elevated to 130.0-130.5° C. by two recrystallizations from ethyl acetate. The results are also presented in Table I. The values obtained by the two methods agree within experimental error.

The impurity (or impurities) in the commercial sample was not nicotinic acid, as indicated by the fact that less than 0.02 ml. of tenth-normal alkali was required to neutralize a solution containing a gram of nicotinamide. A positive test for sulfate with barium chloride reagent was obtained before but not following the recrystallizations of the sample.

With tenth-gram samples of nicotinamide, m. p. 130-130.5° C., synthesized from nicotine (2, 3) in this Laboratory and recrystallized once from ethyl acetate, analyses by the modified method resulted in higher values, 99.40 and 99.35 per cent., than those obtained with the

purified commercial sample. The procedure is accordingly capable of yielding values approaching 100 per cent. when the amide is pure.

That the presence of nicotinic acid does not interfere with the determination of nicotinamide was shown by the analysis of a mixture containing 70 per cent. nicotinamide and 30 per cent. nicotinic acid. A value of 70.06 per cent. for the amide was obtained. Also, the presence of amide does not interfere with the determination of nicotinic acid in such a mixture. In a mixture containing 66.67 per cent. nicotinic acid, a value of 67.06 per cent. was obtained by the U. S. P. XII assay.

The modified method described, possessing the same degree of accuracy as the U. S. P. XII assay, appears to have certain advantages not held by the latter. The sample can be weighed directly into the Erlenmeyer distilling flask. Its size can be reduced to approximately one-half that specified in the U. S. P. assay. The danger of acid being drawn back into the distilling flask during the "boil gently" period in the alkaline hydrolysis of the U. S. P. technique is eliminated by initial hydrolysis with concentrated hydrochloric acid. Since all the ammonia distills over in 15 ml. of distillate, it is unnecessary to collect large volumes of distillate, and the usual distilling time of about an hour can be decreased to approximately twelve minutes. No bumping occurs at any time during the distillation. Duplicate analyses can be completed in fifty-five minutes. As no diminution in accuracy occurs in regular Kjeldahl distillations by using different quantities of absorbing acid in excess (4), the amount of standard acid specified in the U. S. P. assay can be reduced from 50 to 30 ml.

No absorbing medium other than hydrochloric acid was used in the modified procedure. The now widely adopted technique, first suggested by Winkler (5) and extensively studied recently (6, 7, 8), of absorbing ammonia in a solution of boric acid and titrating directly with standard acid might be used to advantage. The same is true for the new method for absorption of ammonia described by Bradley (4), in which ammonia is absorbed by water in a closed system and the distillate titrated directly with standard acid.

It is suggested that a test for sulfates be included among the U. S. P. tests on nicotinamide. Sulfate is to be expected as an impurity where nicotinamide is made from nicotinic acid by esterification of the latter in the presence of sulfuric acid, followed by subsequent ammonolysis.

TABLE I

RESULTS OF ANALYSES BY THE U. S. P. ASSAY AND THE MODIFIED METHOD OF A SAMPLE OF COMMERCIAL NICOTINAMIDE BEFORE AND AFTER PURIFICATION

Analysis No.	Procedure Used	Weight of Sample (grams)	Nicotinamide (per cent.)
	Commercial Sample		
1	U. S. P. XII assay*	0.3021	98.13
2	U. S. P. XII assay	0.3020	98.17
3	U. S. P. XII assay	0.3000	98.13
Average	U. S. P. XII assay		98.143
4	Modified method	0.1500	98.13
5	Modified Method	0.1500	98.07
6	Modified method	0.1500	98.13
7	Modified method	0.1500	98.13
Average	Modified method		98.115
	Commercial Sample After Purification		
8	U. S. P. XII assay	0.3034	99.32
9	U. S. P. XII assay	0.3109	99.36
Average	U. S. P. XII assay		99.340
10	Modified method	0.1518	99.28
11	Modified method	0.1500	99.27
Average	Modified method		99.275

* U. S. P. assays were made by Constantine Ricciuti.

Acknowledgment

Appreciation is expressed for the suggestions and criticisms of Dr. James F. Couch of this Laboratory.

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A STUDY OF THE VASCULAR PATHWAYS OF THE RHIZOME AND BASE OF STIPE OF DRYOPTERIS MARGINALIS (Linné) Asa Gray.*

By Murray Finkelstein, M. Sc.

The author, Mr. Murray Finkelstein (now of the Royal Canadian Air Force), while a student at the Philadelphia College of Pharmacy and Science, became interested in the then proposed addition of D. marginalis as a source of Aspidium in the U. S. P. XII. This paper is a thesis based on his findings, some of which were submitted to the Sub-Commitee on Botany and Pharmacacognosy of the U. S. P. XII.—Ed.

Introduction and History

ALTHOUGH Aspidium was official in some of the earlier revisions of the United States Pharmacopœia under the name of Filix Mas, in 1883, the official name Aspidium was adopted for use in the Sixth Revision of the United States Pharmacopœia. This included only the rhizome of Aspidium Filix-mas Swartz, and Aspidium marginale Willdenow, although stipe remnants were mentioned in the monograph. The Seventh Revision adopted the names, Dryopteris Filix-mas Schott, and Dryopteris marginalis Asa Gray. In 1916, stipes were added to the official definition in the Ninth Revision of the United States Pharmacopœia. In the Tenth Revision, 1926, Dryopteris marginalis was omitted as a source of the drug Aspidium, since the supply of Filix-mas coming from Europe was cheaper and more abundant. This also conserved the American supply of Dryopteris marginalis. Owing to the uncertainties in the European drug supply occasioned by the present war, attention has again become focused on the American species, Dryopteris marginalis, which in the last few years has become more plentiful.

The writer was surprised by the dearth of material in his search through the literature for articles dealing with the microscopic

* A dissertation presented to the Faculty of the Philadelphia College of Pharmacy and Science as partial fulfillment of the requirements for the Degree of Master of Science in Biology.

anatomy of the rhizome and stipe of Dryopteris marginalis, and likewise noted with interest the non-uniformity of statements by various authors concerning their structure.

The Sixth Revision of the United States Pharmacopœia states that the rhizome of Aspidium marginale possesses six bundles, and the Seventh Revision describes Dryopteris marginalis as possessing six bundles. The Eighth Revision states that the rhizomes of Dryopteris Filix-mas and Dryopteris marginalis exhibit from six to ten steles. The Ninth Revision of the United States Pharmacopœia accepts the stipe as official as well and describes Aspidium as having from six to twelve bundles, but does not say whether this is Dryopteris Filix-mas or Dryopteris marginalis, and does not make it clear whether this bundle number refers to stipe or rhizome.

Otto A. Wall (4) states that Dryopteris Filix-mas and Dryopteris marginalis possess about six to ten bundles.

Purpose

The purpose of this paper, therefore, is to confirm, correct and augment available descriptions of the microscopic anatomy of the rhizomes and stipe bases of Dryopteris marginalis, with special reference to the origin and arrangement of the vascular pathways.

Materials and Methods

The specimens used were obtained from the valley of the Perkiomen River, Pennsylvania, and from the Gardens of the Blue Ridge, Ashford, McDowell County, North Carolina.

Two distinct methods were used in the preparation of the material in the following study.

The first (non-serial method) involved the free-hand cutting of a series of sections at different levels from various rhizomes and stipes and the counting of the vascular bundles of each section mounted in phloroglucin and hydrochloric acid (lignified tissues turned red). The 16 mm., low power objective of the compound miscroscope and the dissection miscroscope were both used.

The second (serial method) consisted of a study of microtome serial sections carefully prepared according to the following plan:

Fixing.

The rhizomes and stipes were cut into small segments of two to four millimeters in length and thickness and were immediately.

fixed for twenty-four hours in a formalin-aceto-alcohol solution of the following formula:

Ethyl alcohol 50%	90 cc.
Glacial acetic acid	4 cc.
Formalin	6 cc.

Dehydrating, Clearing and Infiltrating.

Ethyl alcohol 50%—2 changes, 4 hours each.
Ethyl alcohol 70%—overnight.
Ethyl alcohol 83%—3 hours.
Ethyl alcohol 95%—1 to 2 hours.
Absolute ethanol—2 changes, 1 to 2 hours each.
Clove oil—2 changes, 2 hours each.
Xylol—2 changes, 1 to 2 hours each.
Mixture of 3 parts xylol and 1 part paraffin (M. P. 55°C.)—3 hours.
Mixture of 2 parts xylol and 2 parts paraffin (M. P. 55°C.)—3 hours.
Mixture of 1 part xylol and 3 parts paraffin (M. P. 55°C.)—3 hours.
Paraffin (M. P. 55°C.)—2 changes, 2 hours each.
Paraffin (M. P. 58°-60°C.)—2 changes, 2 hours and 24-48 hours. (All steps with paraffin were conducted in an oven at a temperature slightly above the melting point of the paraffin.)

Imbedding and Blocking.

These steps were carried out in the usual way.

Sectioning.

Sections were made on a Spencer precision rotary microtome at a thickness of 8 microns.

Fixing Sections to Slides.

This was carried out by floating the sections in their proper order on a drop or two of distilled water on slides devoid of grease. These slides with their sections were then placed on a warm plate for 24-48 hours.

The serial order was maintained throughout, and the sections were properly oriented so that as a result, a numbered series of slides with properly attached serial sections was obtained.

The author found that the material he used cut better by the method outlined above than it did with the tertiary butyl alcohol method which he also tried at first.

Staining, Clearing and Mounting.

A modification of Conant's (2) quadruple staining method was employed according to the following schedule and the results were found to be very satisfactory.

1. Decerated with xylol—2 changes, 3 minutes each.

2. Hydrated through 95, 83 and 70% ethyl alcohol in the order named—2 minutes per step.

3. Stained in a solution made up of 1% safranin (Safranin O, C. I. 841, Hartman and Leddon Co., Philadelphia) and 0.25% auramine (Auramine O, C. I. 655, Hartman and Leddon Co., Philadelphia) in 50% alcohol—24-48 hours.

4. Rinsed thoroughly in distilled water.

5. Stained, each slide separately, in a saturated aqueous solution of crystal violet (Crystal Violet, C. I. 681, National Aniline and Chemical Co., Inc., New York)—1 minute.

6. Rinsed in distilled water to remove excess crystal violet.

7. Dehydrated very rapidly with a few drops of absolute ethanol.

8. Stained with a saturated solution of fast green (Fast Green, Hartman and Leddon Co., Philadelphia) in absolute ethanol and clove oil. (Prepared by dissolving fast green in absolute ethanol and adding an equal quantity of clove oil)—3 to 5 minutes.

9. Poured off fast green. (May not be reused due to rapid hydration and evaporation of absolute ethanol.)

10. Placed few drops of a saturated solution of orange G, in clove oil on slide (prepared by dissolving orange G (Orange G, crystals, Coleman and Bell Co., Norwood) in clove oil, shaken every once in a while for 24 hours and filtered)—15 to 30 minutes.

11. Cleared with a few drops of xylol and allowed to stand in new xylol for 2 to 5 minutes.

12. Mounted in clarite.

Data and Discussion

A. *Determination of Number of Bundles in Stipe Bases by Non-Serial Method.*

Twenty rhizomes with their stipe bases were used for this phase of the work. Stipes were removed from the rhizome at different representative levels close to their origin. In each case, 10 stipes from a rhizome were studied. The group consisted of 6 stipe bases from previous seasons, 3 stipe bases of leaves of present season and 1 stipe base from an unopened frond. Six sections were made at various levels of each stipe base: 1 at the very base of the detached stipe, one at the apex of the stipe base and 4 at various well-spaced intervals. Therefore, 60 sections were studied from stipes belonging to a rhizome, and since 20 rhizomes were used, the total number of sections of stipe bases in which bundles were counted amounted to 1200. Each section was treated with phloroglucin and hydrochloric acid, and the bundles were counted with a dissecting microscope and the low power objective of the compound miscroscope.

The following table represents a summary of the findings of the bundle counts of stipe bases described above.

Number of Bundles	*Number of Occurrences*
2	2
3	22
4	20
5	145
6	238
7	347
8	219
9	112
10	54
11	28
12	11
13	2

As may be seen by a study of the above table, although the limits of the count show 2 to 13 vascular bundles, most of the sections counted possessed from 5 to 9 bundles.

It was found that the number of bundles did not vary with the age of the stipe, but was primarily dependent upon the position in the stipe where the section was taken, as is further discussed below. It was found, as expected, that lignification in the bundle increased with age.

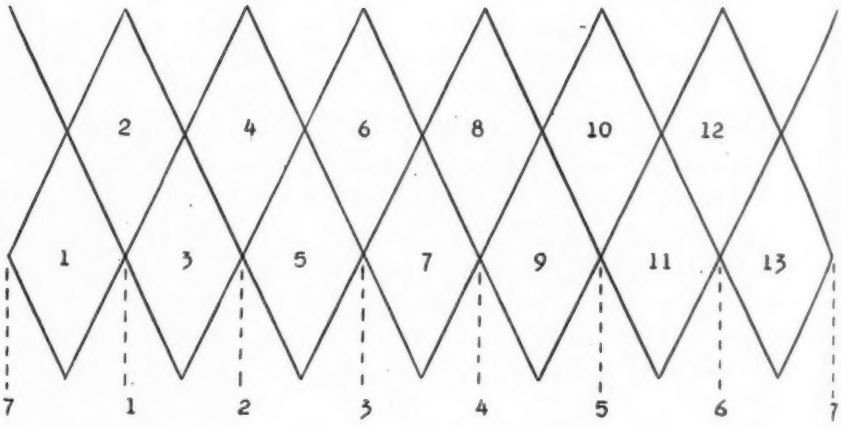
B. *Vascular Pathways and Determination of Number of Vascular Bundles in Rhizome by Non-Serial Method.*

The rhizomes selected were from 3 to 7 cm. in length. Twenty rhizomes were considered in this study. In the cases of 15 of these, sections were taken at various intervals. The remaining 5 rhizomes were freed of their peripheral layers thus revealing the vascular network made more pronounced by immersing in phloroglucin and hydrochloric acid solution for 10 minutes. By this means, the lignified xylem was exhibited as a red rhombic network.

It was found that the lignified xylem in all the bundles studied terminated rather abruptly at the apex of the rhizome and in all cases at approximately the same level. However, non-lignified xylem together with the remainder of the bundle tissue continued almost to the apex. At the opposite end of the rhizome, the posterior end, the bundles were found to terminate at different closely-associated levels. Hence, sections through these parts showed a variable bundle count, from none to the usual number. Although as the apex of the rhizome was approached, the diameter of the rhizome and the size of the meshes grew smaller, the number of meshes around the circumference of the rhizome remained the same. The same plan of distribution was observed at the posterior end of the rhizome (away from the growing point) but with the difference that as the bundle meshes became smaller transversely, they elongated in a longitudinal fashion.

Therefore, the author of this paper found in passing from the posterior end of the rhizome to the apex, that the rhombic meshes were long and narrow becoming larger toward the middle of the rhizome and much smaller toward and near the apex. Although there was a difference in diameter of rhizome at various levels, the number of meshes in circumference remained the same throughout.

Each rhizome of the five examined in the manner described was found to possess the mesh plan around the circumference with points of junction between the adjoining meshes, as shown in the figure below.



PERIPHERAL SYSTEM CUT OPEN AND SPREAD FLAT

Depending upon the plane in which the section is taken we should expect 7 or 14 bundles in a transverse section of a rhizome, as the above figure would indicate. Actually, however, the number of bundles seen in the transverse sections, because of the construction and position of the meshes, was found to vary from 7 to 9. This was found by the study of the transverse sections made from the 15 rhizomes mentioned above, 10 to 15 sections at approximately equal intervals being studied from each rhizome.

The size of an individual rhizome bundle when viewed in transverse section varied depending upon where the section of that bundle was made—at a mesh junction, through a single mesh bundle or at a point of thickening on a rhizome bundle which was the beginning of a leaf trace. The degree of inclination of the bundle also furnished a source of variation.

C. *Vascular Pathways of Stipe Base as Studied in Serial Sections.*

The drawings in figures 1-26 were made from serial sections prepared from material obtained by removing the stipe base with the adjacent part of the rhizome. Outline drawings 1-26, 27-44 and 45-66 of representative serial slides were made with the aid of a Bausch and Lomb projector. The vascular skeleton, Fig. A, is a

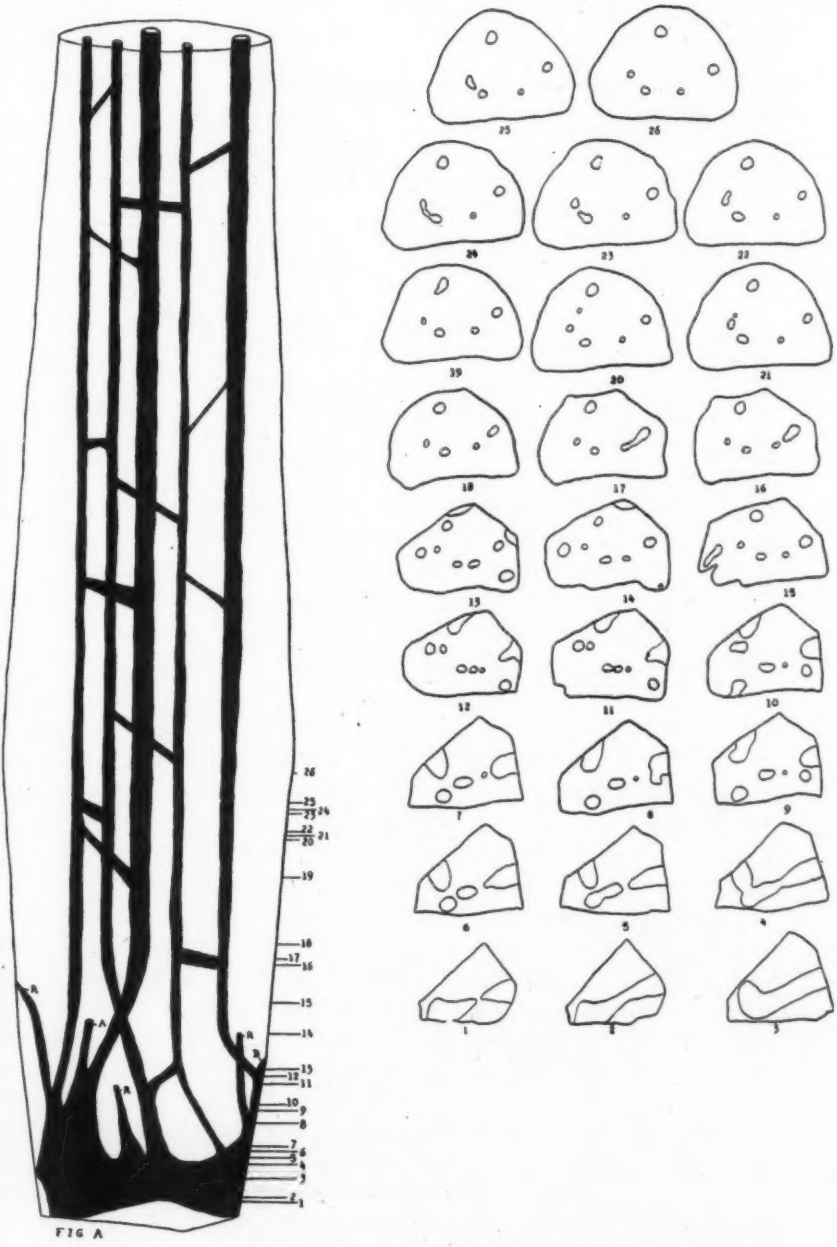
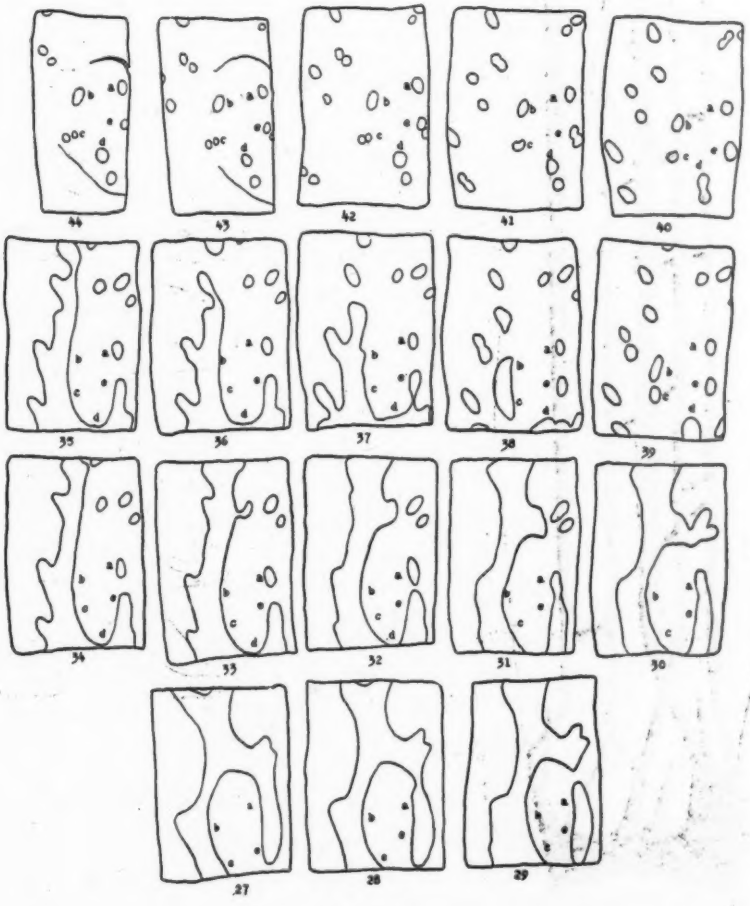


FIG. A—Plan of vascular pathway of stipe and adjacent portion of rhizome of *Dryopteris Marginalis* reconstructed from transverse serial sections. R, Root vascular bundles; A, B, Vascular bundles of adjacent stipes.

FIGS. 1-26—Outline drawings of transverse sections, drawn with projection apparatus. Levels are indicated by corresponding numbers in Fig. A.

composite drawing embodying the results of the careful study of the position and arrangement of the vascular bundles in the various sections passing serially from rhizome into stipe base. The stipe base in question is the one mentioned above from which outline drawings 1-26 of transverse sections were made.

The direction and distribution of the course of the bundles in the stipe base may be clearly studied in the figures.



FIGS. 27-44—Representative outline drawings of transverse sections of a serially sectioned stipe and adjacent rhizome of *Dryopteris Marginalis*, showing origin of stipe vascular bundles.

The root bundles are represented in Fig. A by the letter R. One of these is seen leaving the stipe, while the other two also leave the stipe but in a plane toward the observer, hence they cannot be shown in Fig. A. It may be said here, that the roots may arise either directly from the rhizome or from the base of the stipe close to the junction with the rhizome. "A" and "B", in Fig. A, are leaf traces which do not go into the stipe illustrated.

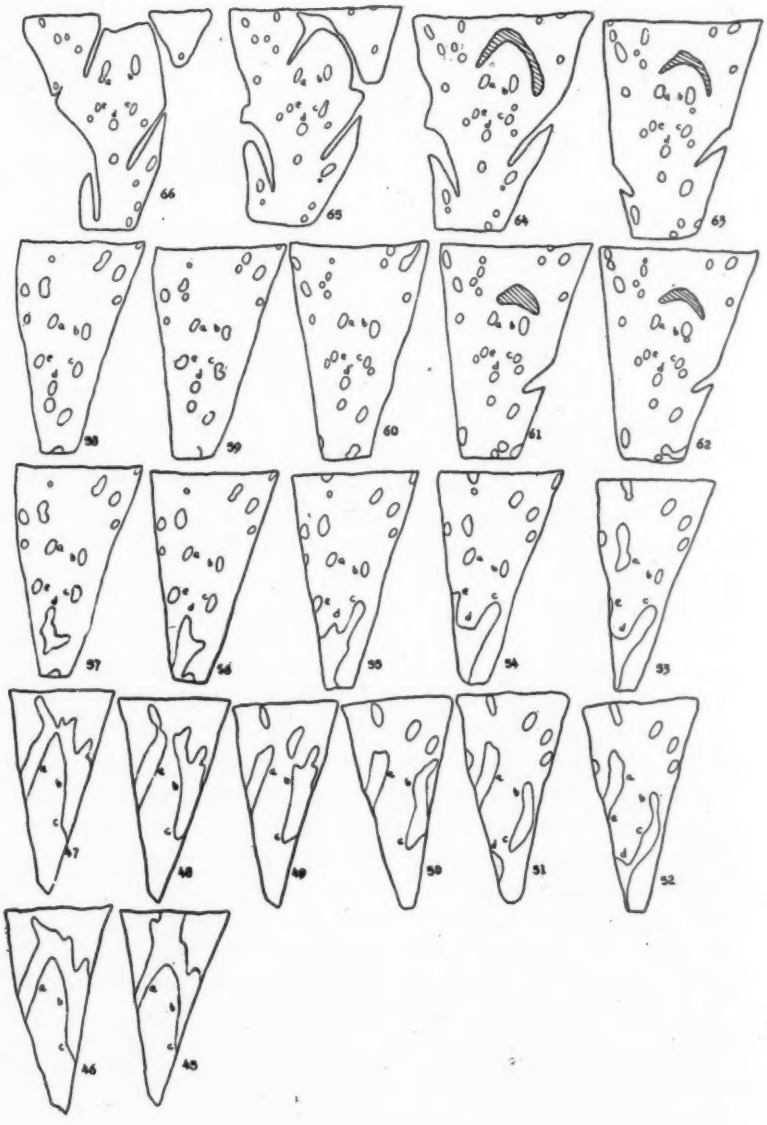
Figures 27-44 are outline drawings of representative serial sections from material obtained by carefully exposing and detaching one rhizome mesh and adjacent stipe base of another plant. Although care was taken to avoid it, the material was cut at a slight angle with the result that a complete mesh was not obtained, although as may be seen from the figures it was almost entire. It may be noted here that figures 27-38 exhibit mostly longitudinal sections of the rhizome bundles, wherein the smaller structures represent the leaf trace bundles in outline. The origin of these lettered leaf trace bundles may be followed by means of the successive drawings. It is to be observed that the lettered bundles in the drawings pass up into a single stipe, the other bundles, which are unlettered, have a different subsequent history. It may also be noted that bundles "a" and "e" originate on one side of the rhombic mesh, bundles "b" and "c" on the other side and bundle "d" in the lower angle of the rhombic mesh.

The material from which figures 45-66 were prepared was cut in the same manner as that just described but from a different rhizome, and the study was carried out in the same way.

In drawings 61-64, open spaces have arisen around part of the emerging stipe. The spaces have been cross hatched whenever enclosed in the outline of the stipe in order that they may not be confusd with outlines of bundles.

We may therefore conclude, from a study of the figures, that the direction of the bundles follows the longitudinal axis of the stipe. However, although not shown by the figures, a temporary union of two main stipe bundles has been observed by the writer. On the other hand, small branches from one main bundle to another may run diagonally or transversely. This branching is represented clearly in Fig. A.

The variation in number of vascular bundles found in studies of transverse sections at various levels of the stipe base was due to this branching and union of bundles.



FIGS. 45-66—Representative outline drawings of transverse sections of a serially sectioned stipe and adjacent rhizome of *Dryopteris Marginalis*, showing origin of stipe vascular bundles.

The diameter of any main stipe bundle was found to vary at different locations. For example there was a tendency to increase in diameter before sending off a branch and in many cases a tendency to decrease later. This phenomenon of increase and decrease in diameter was present throughout the course of the bundle as far as studied.

Based on the above study of the stipe bases taken at various levels from different rhizomes, the position of stipe on rhizome did not materially influence the number of main stipe bundles. Although, the larger the stipe, the more prolific was the bundle branching.

The main stipe bundles, which were found to be five in number, had their origin from the rhizome bundles as observed in the figures. Apparently the inside of each rhombic mesh supplied one stipe—the stipe bundles arising from each side of the mesh and one from the lower angle of this same mesh.

This finding may be compared with the statement of Arthur J. Eames and Laurance H. MacDaniels (1): "The number of traces supplying the leaf ranges, . . . from one to many. In the Pteridophytes there is in most cases one, though sometimes there are two or many."

Summary

1. There were five main vascular bundles in each stipe studied.

2. There were five traces arising from the inside of each rhombic mesh of the rhizome. There were two stipe bundles arising from each side of the mesh and one from the lower angle of this same mesh.

3. There was considerable branching and anastamosing of the bundles in the stipes to which was due the variation in the number of vascular bundles found at different levels in the same stipe and also in stipes in general.

4. The diameter of any main stipe bundle was not constant throughout its course.

5. The average number of vascular bundles in stipes varied from 5 to 9, although the limits of the count showed from 2 to 13.

6. The number of mesh vascular bundles in transverse section of the rhizome varied from 7 to 9.

Acknowledgment

The work reported here was done in the biology department of the Philadelphia College of Pharmacy and Science under the direction of Dr. M. S. Dunn, to whom the author wishes to acknowledge indebtedness for guidance and helpful criticism during this investigation.

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A. PH. A. COMMITTEE ON PHARMACEUTICAL RESEARCH ANNOUNCES RESEARCH GRANTS

Grants are to be made by the Council of the A. Ph. A. on the recommendations of the Committee on Pharmaceutical Research. They are to be made on the following basis:

(a) the extent which the award will serve to promote pharmaceutical research

(b) whether the award supplements the A. Ph. A. laboratory program

(c) the qualifications of those who will perform the work for which the award is made and the facilities of the laboratory where the research will be conducted

(d) preference will be given to applications wherein the award will supplement a contribution from the institution or laboratory in which the research will be conducted

Those interested in being considered for the above awards will please communicate promptly with the Chairman of the Committee on Pharmaceutical Research (Francis E. Bibbins, 150 West 64th Street, Indianapolis, Indiana) who will send application blank which, when returned, will supply all the details that will enable the Committee to carefully evaluate the projects listed in the application. These applications should be forwarded promptly so that they can be given early consideration.

TRUTH AND FICTION IN THE ADVERTISING CLAIMS OF DENTIFRICES

By T. Swann Harding*

EARLY in his career as an earth-being Man felt the necessity for cleaning his teeth. Since the process was mildly unpleasant as he performed it primitively he felt certain that it was good for him and prevented tooth decay. Today, naive people who have read or heard the advertisements too credulously, write in to the American Dental Association plaintively declaring that they brushed their teeth and massaged their gums with a certain dentifrice, but that their gums still bleed, advertising to the contrary notwithstanding.

Dentifrices were described in ancient Roman literature. The Romans made rather magnificent tooth powders using as ingredients the bones, hooves, and horns of animals and the shells of eggs, crabs, and oysters, reduced to a fine powder which was sometimes mixed with honey. Astringents like myrrh, nitre, and hartshorn were also used.

The tooth powder of Messalina, wife of the Emperor Claudius, was, according to Scribonius Largus, calcined stag horns mixed with mastic and sal ammoniac. In other cases the teeth were regularly and no doubt piously cleansed each morning with the urine voided during the night. For Man will go far to do the right thing. Today he even reads the dentifrice advertisements and often believes them. And the manufacturers of dentifrices have done almost everything to sell their output, except tell the plain truth about their products.

Moreover it does seem rational to think that regular washing of the teeth will prevent their decay. Actually there is no scientific proof that this is so. Some wholly unwashed teeth show no decay at all.

Since we entered total war, advertising has been under fire from some quarters. Indeed, a couple of hundred economists recently recommended that such appeals to consumers be discontinued almost altogether in order to save paper, equipment, power, other materials, and skilled labor. Few types of advertising are as economical of the truth, however, as those written to recommend dentifrices of sorts.

It costs real money to put a dentifrice over, too. It has been nothing unusual, for instance, for the makers of Pepsodent to expend

* Falls Church, Va.

nearly one and three-quarter million dollars in one year on advertising. That is more than enough to pay for the wartime publication program of the Department of Agriculture, and the honesty and usefulness of its publications rate high—very high in comparison to some claims makers of Pepsodent have made in their time.

Makers of Kolynos have considered it worth while to spend more than $350,000 in a single year to tell the public its merits; Pebeco has usually gotten by on a little less than $200,000, and Forhans on about $132,000. These figures are not unusual and may be regarded as quite typical. What does the public get in return?

It gets told, for instance, that our modern tendency to eat soft foods causes dental decay. Experiments indicate, however, that hard foods containing carbohydrates are easily impacted between the teeth to remain there causing decay, whereas soft foods do no such thing. Certain primitive peoples who customarily eat slop have excellent teeth. Even finely ground, porridge-like diets rarely cause decay if there is sufficient intake of vitamins and calcium.

The advertisements often extol the germ-destroying power of dentifrices. But carefully controlled tests of a number of so-called "antiseptic" dentifrices, all of which contained antiseptics of lesser value than carbolic acid, indicated they had little germ-killing ability and were of no value in Vincent's angina or in pyorrhea.

Another advertising trick is to say that dentists agree in recommending this or that particular dentifrice. The statement is often made in an authoritative tone by a professional-sounding voice on the radio. All of the following have been called the dentist's choice in advertising—Squibb, Listerine, Kolynos, Pebeco, Pepsodent, Ipana, Bost, Colgate, Dr. Lyon's Tooth Powder, and Phillips' Dental Magnesia. Obviously the claim cannot be true in all these cases.

The owners of Dr. Lyon's Tooth Powder actually spent $4,210,000 in seven years in an intensive campaign to convince readers and listeners that dentists use powder and we should do as our dentists do. The joke is that dentists do not use powder for cleaning teeth; they use pumice or other polishing substances made into a paste with water, glycerine, or other mediums. Furthermore, investigation in 1927 showed Dr. Lyon's to be one of the most abrasive dental cleaners on the market.

The American Dental Association holds that a dentifrice has but one function,—to aid the toothbrush in cleaning tooth surfaces. It has no therapeutic value whatever. The dental association has rec-

ommended a nonabrasive dentifrice. It is composed of powdered hard soap, precipitated calcium carbonate, and certain flavoring oils. It is just a dentifrice. It has no disease-preventive powers; it is non-efficacious therapeutically. It helps clean teeth. It is not a medicine.

The rather impressive advertising expenditure on Pepsodent was mentioned above. This product was recommended some twenty-odd years ago to dissolve "mucin plaques" which were said to form on the teeth and which were described as the source of most tooth troubles. Research reported in 1917 showed Pepsodent to be an acid paste containing something that acted feebly like pepsin, but which could not dissolve mucin plates when used in the dentifrice. Yet the tubes were then labeled "proteolytic tooth paste (dental mucin digestant)."

It was stated at this time that Pepsodent was made in apparent ignorance of or disregard for the dental and biochemical principles involved. A booklet issued by the makers of the dentifrice was said by Dr. William J. Gies fallaciously to create the impression that there was something very profoundly scientific about the action of the toothpaste, which was untrue.

Suppose we now take a hurried look at some other dentifrice claims.

As early as 1933 the American Dental Association stated, on a basis of research tests, that the claim of Kolynos to make teeth "three shades lighter" was extravagant. Dr. J. J. Durrett also said that its claims to destroy germs were in a class with those made for fake antiseptics. Four years later the Federal Trade Commission issued a complaint against these claims, calling the company's representations misleading and untrue. Another and very similar action followed a year after that. But it was a year later still when the makers were told to cease making their false claims.

After the makers started telling the truth about Kolynos, and the American Dental Association accepted it, advertising in the Journal of the American Medical Association (March 16, 1940) began honestly to read: "Kolynos Dental Cream is a concentrated dentifrice that contains no added water. When used, one-half inch on a dry brush, Kolynos produces a foamy cream in the mouth that assists the brush in cleansing and polishing the teeth without harmful abrasive action." But it took about seven years to harass Kolynos into simple truthfulness.

Ipana's record is about as lavish. The American Dental Association found it unacceptable in December 1934 because its advertising

made unwarranted claims and because it contained "ziratol", said to be another unacceptable proprietary of secret composition. It did contain soap and betanaphthol but would neither prevent nor overcome Vincent's disease, gingivitis, pyorrhea, root infection or the unknown clinical entity "pink tooth brush."

In 1936 the *Journal of the American Dental Association* still ridiculed the idea that one could build helpful gums by massage and Ipana containing "ziratol," though some dental journals actually carried this untruthful advertising. A year later the Federal Trade Commission directed Bristol-Myers Co., makers of Ipana, to stop representing that the dentifrice and gum massage would prevent anyone from becoming a "dental cripple." "Ziratol" was really betanaphthol and lacked the therapeutic powers claimed for it.

The makers of Ipana became more refulgent in their claims, however, for in October 1942 the Federal Trade Commission forbade them to claim that using this dentifrice would produce a beautiful smile, increase popularity, remove yellowish tints from and whiten teeth, impart strength to the gums, and prevent "pink toothbrush." The makers denied these charges and then went on to say that Ipana was not a cosmetic within the meaning of Federal legislation, whatever that itself may mean.

In December 1942 the *Journal of the American Dental Association* said that Bristol-Myers had spent $1,214,571 advertising Ipana in 1941, and that many people were writing in now to say that they had used the dentifrice with gum massage, but their gums still bled. Would the dental association tell them why? Others had begun to doubt the company's propaganda. By now "Ziratol" had gone with the foam, and it was being said that soft foods caused "gum disorders."

Though the therapeutic claims were subtly woven into the fabric of other statements which were true, the dental council said they lacked scientific basis. It concluded that Ipana was a simple cosmetic agent neither necessary nor desirable for gum massage, and doubted that a majority of dentists used it, as the makers jubilantly claimed. It was essentially a mixture of soap, chalk, and glycerine, with flavoring and binding materials. In February 1943 the Food and Drug Administration announced action against Ipana's misleading cartons. The tooth paste filled but 23 per cent. of the carton capacity. The makers ultimately failed to repackage the goods seized and it went to penal institutions. Do fewer criminals now have bleeding gums?

It was a decade ago that Colgate invented its low-surface-tension claim, quoting scientists to back this up. One scientist so quoted wrote to *Science* (March 13, 1931) and said he had never made any such statement. He had not said that Colgate's was the best of 33 dentifrices tested. He went on to state that if you wanted to lower the surface tension of a mixture of saliva and tooth paste, just use soap. In November 1938 the dental council announced that Colgate's Ribbon Dental Cream was not acceptable to it.

Of course it had grown up by then and invented other claims, among them its famous "seven-stain-removal" propaganda, and its current claim to combat bad breath. The dental council scoffed at both claims and pronounced the advertising propaganda unwarranted, and again insisted that, like mouth washes, dentifrices had no value in mouth hygiene.

Finally on July 6, 1940, the Colgate-Palmolive-Peet Co. came to confession at the Federal Trade Commission. While admitting that it had lied in its advertising for Palmolive Soap, Cashmere Bouquet Soap, Concentrated Super Suds, Colgate Shaving Cream, and Palmolive Shaving Cream, the company put in an aside that it would discontinue the untruthful claim that Colgate dentifrice aided bad breath. It then went on to admit that Kirkman Soap Flakes would not keep the hands soft and white or enable textiles to retain their original appearance.

This sounds like a perfect orgy of truth telling, but the advertisers can always think up new lies that have to be proved untrue. Back in 1933 the makers of Dr. Lyon's Tooth Powder were claiming that its use would make teeth "gleaming white," as if anyone would want such atrocious looking teeth if procurable. The American Dental Association held that teeth were naturally of many shades, that white teeth would be very undesirable worn with many complexions, and that Dr. Lyon's would not whiten teeth anyway.

Disparagement of pastes by the makers of Dr. Lyon's powder was deplored by the dental association in 1936. Two years later the Federal Trade Commission entered complaint against the claim, direct or by implication, that powders were more effective than pastes or that Dr. Lyon's powder was comparable to preparations used by dentists for cleaning teeth. It cited false claims also that Dr. Lyon's was anti-acid, neutralized acid mouth, was a deodorant, was more economical than competitive brands, or would make all normal teeth white and brilliant.

Once again the American Dental Association announced in July 1940 that Dr. Lyon's Tooth Powder was a simple mixture of chalk and soap originally marketed by Dr. I. W. Lyon in 1866, though the original product may have been different in composition. The product was not an anti-acid, could not "sweeten" or "purify" the breath, and appeared to be quite abrasive. There was no evidence that it was the preparation of an experienced practical dentist. It would scratch glass!

The false claims of Dr. West's Tooth Paste were confuted by the Federal Trade Commission January 18, 1933. The claims of Bost Tooth Paste to clean smokers' teeth were dissipated by the American Dental Association in May 1936. But it was December 15, 1939, when its makers promised the Federal Trade Commission they would no longer falsely claim that Bost's removed tobacco stains that had been absorbed into the enamel of the teeth.

It was in January 1943 that the American Dental Association declared Forhan's, a combination of soap, chalk, glycerin, zinc chloride, some gums and flavoring extracts, would not act as an astringent or help prevent bleeding gums (along with massage) and caries. Neither would it remove acid film or brighten dull teeth. It was said to be an irrational mixture, and one can well believe that. The same authority denounced the somewhat similar claims of Worcester Salt Tooth Paste in January 1937. In doing so the dental council wrote:

> "It thus appears that the vendors of Worcester Salt Tooth Paste have adopted the usual technique of exaggeration and pseudo-science of most of the national advertising dentifrice industry and claim for what may be no more than a cleansing agent, preventive and therapeutic properties. In doing so, its advertising copywriters have fished in the murky waters of advertising dental 'science' to build up a story for their product. Most national dentifrice advertising attempts to make people conscious of mouth diseases and conditions which they do not possess. Advertising can make a tooth paste no more than it is, an aid to the toothbrush in cleansing the surfaces of the teeth."

In June 1937 the Federal Trade Commission ordered the makers to stop asserting that Phillips' Milk of Magnesia Tooth Paste was "the best way yet discovered or science's latest discovery for cleaning teeth." The Charles H. Phillips Chemical Co. forms part of Sterling Products Inc. which also controls Dr. Lyon's powder.

McKesson and Robbins' Calox was told in May 1939 to quit advertising that its use would make your teeth shine like the stars.

In connection with these claims photographs of movie stars were used. The Federal Trade Commission said Calox had no special magic for cleaning between the teeth either. The company invented some new statements that were quite as misleading and the Commission again told it to discontinue false and misleading advertising claims in December 1939.

In October 1939 the Council on Dental Therapeutics held that the makers of Listerine Tooth Paste made unwarranted therapeutic claims for it; it did not decrease the prevalence of caries nor was its detergent lacking in toxic properties. The E. R. Squibb & Sons concern promised the Federal Trade Commission in February 1942 that they would discontinue false claims that the use of Squibb dental cream and tooth powder tended to prevent tooth decay, or that either product contained concentrated milk of magnesia.

To complete this sorry record the Federal Trade Commission in August 1938 ruled that Vince, a sodium perborate preparation, was not an adequate treatment for colds or pyorrhea, would not neutralize mouth acid, and was not recommended by dentists and physicians as an ideal aid to sparkling teeth, a clean mouth and healthy throat. Besides, sodium perborate was a potentially dangerous drug.

What constructive suggestion could be drawn from this dismal review? The facts are that many people have intolerably rotten teeth and that dentists are slow-paced and high-priced. The best way to end silly pseudoscientific claims for dentifrices would be to render dentistry scientifically efficient. That means organization along the lines proposed by Dr. Charles L. Hyser of New York. Disorganized dentists in private practice must remain forever unable to treat the masses and too high-priced for those they can manage to treat.

A non-profit organization should be set up with master dentist-doctor experts at the top to plan, map the field, say what patients need, provide written instructions, and see that dental technicians carry them out. The technicians would work on the assembly-line principle, efficiently and rapidly. One such line should consist of five men to prepare cavities, two to take impressions for inlays, and three to fit them in. Ten such men could install 160 inlays daily.

In another assembly line two men would take impressions, two others would take bites and decide on tooth color, four would fit bridges or dentures, and eight would finish up. Thus 80 bridges and dentures could be completed daily. If the group were headed by two

surgeon dentists, two X-ray men, eight hygienists, and two supervising doctor-dentists, it could produce 200 synthetic fillings, 160 inlays, and 80 dentures and bridges daily. It would have its own laboratory and do all its own work.

Assuming 30,000 patients, 70 operators, 20 hygienists, 6 surgeons, and such chair assistants, clerks, and technicians as were needed, the average person could have his mouth fixed up completely for $30. To maintain good teeth would cost about $5 a year thereafter. There is no functional reason why this could not be done. If we desire to make dentistry economically and scientifically available, and to end false therapeutic claims for dentifrices for good, this should be done. That, and due attention to our diets, would be all we should need.

THE HOSPITAL CORPS QUARTERLY

Once again the problems of the Hospital Corps are multiplied by wartime conditions and the Bureau of Medicine and Surgery of the Navy Department has reissued the Quarterly as a supplement to the United States Naval Medical Bulletin. The Hospital Corps Quarterly was first published in 1917 as the result of the need during the World War of supplying to the Hospital Corps useful information regarding their duties and in other ways promoting the morale and efficiency of the Hospital Corps.

The subjects treated are usually new procedures, technics and devices intended to increase the efficiency of the corpsman in the performance of his assigned tasks. A great deal of useful information is presented for those not in the service but who are interested in war medicine. Excellent photographs and illustrations are used throughout the text.

Those not in the Navy may obtain this interesting and valuable publication from the Superintendent of Documents, Washington, D. C. Yearly subscription $1.00.

TWO DECADES OF U. S. P. VITAMINS

By E. Fullerton Cook, Ph. M.*

FOLLOWING closely upon the establishment of the therapeutic importance of vitamins, the Pharmacopœia undertook the setting up of standards and assay methods for use in the United States.

Fortunately the Commission on Biological Standardization of the League of Nations, early in the development of vitamin therapy, had established reference standards for International use for a number of the vitamins, and these were available as the basis for U. S. P. monographs and reference standards.

The U. S. P. X—The U. S. P. X (1925), however, even before the establishment of international standards, had recognized the necessity for the advice and guidance of experts in the vitamin field and during the Tenth Revision, about 1924, a special U. S. P. Vitamin Committee was created, under the chairmanship of Dr. John F. Anderson. This committee included such outstanding pioneers in the vitamin field as Dr. Lafayette B. Mendel who discovered Vitamin A, Dr. Henry C. Sherman, Dr. E. V. McCollum who discovered Vitamin D, and Dr. Alfred F. Hess. The U. S. P. X established the first standard method for the assay of Vitamin A, but this assay was optional and was intended primarily to insure the presence of Vitamin A, since cod liver oils at that time were frequently subjected to bleaching or purification processes, which destroyed the vitamins naturally present. At this time the term "Vitamin D" was not yet in use, although the presence of such a substance in cod liver oil was known and was referred to in the U. S. P. as an "antirachitic activity".

Following this initial attempt of the Pharmacopœia to standardize vitamins, the knowledge of vitamins expanded rapidly and before another Pharmacopœia could appear, it was necessary for the U. S. P. X to issue, in 1934, an "interim revision announcement" which provided a more satisfactory assay for Vitamin A, which was now made

*Chairman, Revision Committee United States Pharmacopœia.

compulsory, and at the same time added an assay for Vitamin D. A minimum potency for cod liver oil, covering both of these vitamins, was also fixed.

These standards and assay methods were developed by an officially appointed U. S. P. Vitamin Advisory Board which held open conferences, and were voluntarily assisted by more than twenty laboratories associated with the Government, or with private, university, or industrial organizations. These laboratories carried out collaborative assays whereby various assay methods were compared and perfected, and the first U. S. P. reference cod liver oil, having known Vitamin A and D potency, was established. This Vitamin A and D potency was in terms of "U. S. P. units," but the units had the same value as the international units. The U. S. P. reference cod liver oil and the U. S. P. units were immediately adopted in this country for the standardization of Vitamin A and Vitamin D potency.

The U. S. P. XI—The U. S. P. XI (1935) continued the standardization of cod liver oil for Vitamins A and D and added "Viosterol" (synthetic Vitamin D) under the title "Solution of Irradiated Ergosterol," and the Second U. S. P. XI Supplement (1939) added ascorbic acid (Vitamin C), nicotinic acid, and thiamine hydrochloride (Vitamin B_1), and also a solution of Vitamin A in oil and a solution of Vitamins A and D in oil, the latter a sort of synthetic cod liver oil.

The U. S. P. XII and the First U. S. P. XII Bound Supplement—When the U. S. P. XII appeared in 1942, the use of numerous vitamins had become so well established and their employment in combinations similar to those found in food so thoroughly accepted by medical authorities that the Pharmacopœia found it desirable to provide recognition and standardization for an increasingly large number of these substances.

The U. S. P. XII and its First Bound Supplement, soon to appear, will then contain the following basic vitamins and their preparations:

U. S. P. XII Vitamins and Vitamin Products

Ascorbic Acid (Vitamin C)
    Ascorbic Acid Tablets
Menadione (Vitamin K)
    Menadione Tablets

Soluble Menadione
Soluble Menadione Injection
Nicotinic Acid
Nicotinic Acid Tablets
Nicotinamide
Nicotinamide Tablets
Thiamine Hydrochloride (Vitamin B_1)
Thiamine Hydrochloride Tablets
Rice Polishings (Vitamin B_1 and the B Complex)
Extract of Rice Polishings
Dried Yeast (the B Complex)
Dried Yeast Tablets
Liver B-Vitamins Concentrate
Liver B-Vitamins Injection
Riboflavin (Vitamin B_2 or G)
Riboflavin Tablets
Cod Liver Oil (Vitamin A and D)
Emulsion of Cod Liver Oil
Non-destearinated Cod Liver Oil
Halibut Liver Oil (60,000 Vitamin A)
Halibut Liver Oil Capsules
Oleovitamin A (50,000 Vitamin A)
Oleovitamin A Capsules
Oleovitamin A and D (similar to Cod Liver Oil)
Concentrated Oleovitamin A and D (similar to Halibut Liver Oil with Viosterol)
Concentrated Oleovitamin A and D Capsules
Synthetic Oleovitamin D (Viosterol or Delsterol)
Hexavitamin Capsules (Vitamins A. D, C, with
Hexavitamin Tablets (Thiamine, Riboflavin, and Nicotinamide)
Triasyn B Capsules (Thiamine, Riboflavin
Triasyn B Tablets (and Nicotinamide)
Triasyn B with Liver Capsules (Thiamine, Riboflavin, Nicotinic
Triasyn B with Liver Tablets (Acid with Liver Concentrate)
Triasyn B with Liver Injection (Thiamine, Riboflavin, Nicotinic
(Acid and Liver Concentrate)

The U. S. P. Vitamin Advisory Board as now established has the following membership: Dr. C. A. Elvehjem, University of Wisconsin, Madison, Wis., Dr. C. G. King, Scientific Director of The Nutritional Foundation, Inc., New York, N. Y., Dr. E. V. McCollum, Johns Hopkins University, Baltimore, Md., Dr. E. M. Nelson, Vitamin Division, Food and Drug Administration, Washington, D. C., and Dr. E. Fullerton Cook, Philadelphia, chairman.

U. S. P. Vitamin Reference Standards—The U. S. P. Board of Trustees have also provided reference standards for use as a basis for the standardization of the official vitamins and their preparations. The following are now distributed through the office of the Chairman of Revision:

Cod Liver Oil—Vitamin A Standard
Cod Liver Oil—Vitamin D Standard
Cod Liver Oil—Vitamin D Standard for standardization Poultry Food by the Chick Assay.
Ascorbic Acid
Nicotinic Acid
Riboflavin
Thiamine Hydrochloride
Menadione
Calcium Pantothenate
Pyridoxine Hydrochloride (Vitamin B_6)

SOLID EXTRACTS

Pointed Paragraphs of Timely Interest

The Institute of Food Technologists, in a preview of its convention banquet, points with pride to the fact that the entire meal will be point-free, insofar as the current war rationing system is concerned. All dehydrated foods will be utilized, the bill of fare ranging from tomato juice, dehydrated of course, through broiler turkey, a chef's salad using dehydrated vegetables, to apple pie made from dehydrated apple nuggets. Fortunately, the press release insists that only the meal will be pointless, inferring, we hope, that the post prandial orations will not only have some point to them, but will be far from dehydrated, as well.

AJP

The mosquito season will soon be with us, and many a pool of standing water will have floated on its surface a film of petroleum oil or larvicide. This is not only objectionable, but may create a fire hazard. Thus, the suggestion that there be added from 0.1 to 0.25 per cent of ordinary soap, to reduce the surface tension, making the pupae lose their floating positions and suffocate. Egg-laying by the mosquito is also interfered with in this manner. In addition to this, higher concentrations of soap, up to 1 per cent., will kill the mosquitos directly.

AJP

The Amercan Social Hygiene Association reports that if the venereal disease rate in this war is only half of that in the last war, 378,000 of the proposed total of 10,800,000 men in the armed forces will acquire syphilis or gonorrhea each year. If the time loss is only half of that in the last war, there will be a total man day per year loss of 7,560,000, the equivalent of 21,000 men out of service. This does not take into consideration the time and trouble placed upon the medical services of the armed forces.

Two tons of steel are required each month in the manufacture of files to be used in the opening of ampules. Physicians and pharmacists are requested to save these files after using, and return them to the manufacturer for re-use if in good condition, or for contribution to the national scrap metal drive if they will no longer cut satisfactorily.

AJP

The Greeks may have had a word for it ("it" meaning almost anything), but modern science has a word for "it," too. And the word is "Electronics," which has been defined unofficially as a new science in a new world.

The science may be new, but its establishment has helped us understand many an old phenomenon and achievement, and it has put us on the threshold of new and startling discoveries. What may come from the electron microscope is conjectural. Modern transmutation of the elements has brought to us the happy culmination of the ancient alchemists' dreams, and the guiding of airplanes by electronic tubes has enabled man to make full conquest of the air. Radio, television, the electric eye, the X-ray, electric therapy and many other adaptations of the basis of this new science are, without doubt, making this world a better place in which to live, and live longer.

AJP

Mica, indispensible in the electrical industry, is now being found in other Americas, to supplement the supply usually received by North America from India. Deposits have been located in Brazil, Peru, Columbia, Bolivia, Venezuela, Argentina, Mexico and Guatemala.

AJP

Production of natural rubber is being encouraged by the distribution of rubber-yielding Hevea tree seeds from surplus areas to other places where this much-needed product may be grown. For instance, seeds have been sent from Brazil to neighboring countries and as far north as Central America. Other seeds by the millions have gone from Mexico, Costa Rica and the Canal Zone to help establish rubber nurseries in Central and South America. The usual method of distribution is by airplane.

BOOK REVIEWS

Drug Store Accounting. By J. Brooks Heckert and William E. Dickerson. First edition, 415 pages, including index. McGraw-Hill Book Co., New York, N. Y.

Professors Heckert and Dickerson have prepared a book which is sure to be decidedly helpful to the pharmacy owner who is wondering just what kind of records he should keep in his store and how he should interpret these records. The book contains, in addition, a discussion of some subjects which are adjacent to but which are not ordinarily considered to be a part of accounting. Among them are insurance and the various tax liabilities which a pharmacist incurs when he operates a store of his own. There are also references to inventory taking methods and methods of determining the costs of handling and selling individual items in a pharmacy.

The principal users of this book no doubt will be pharmacy students who before they graduate are expected to acquire a sufficient acquaintance with accounting records to be able to use and understand them if they become proprietors of pharmacies of their own. Certainly no one can make a valid complaint against anything which would create a greater appreciation of the need for accounting records in a pharmacy and an understanding of this need by practicing pharmacists.

The greatest weakness to be found in this textbook of over 400 pages, or of any work of such length, is its formidable appearance. Unfortunately there are many pharmacists with stores of their own and students who in years to come will be proprietors who, after looking at this extensive treatise, will decide that accounting is just too much for them to become acquainted with. This decision will be made in the same manner that you or I might pick up a Russian language textbook and decide that, while it would be helpful to have a speaking knowledge of Russian, it is just too much trouble to learn it. I feel that all too many pharmacists will be frightened away from an accounting knowledge by the very size of this book.

I am sorry to observe in this book a statement with which I most emphatically do not agree and one which is sure to bring down the

wrath of those who criticize the commercial nature of much that goes on in the present-day retail pharmacy. This statement is the opening one in the preface and it is, "The modern drug store is largely a merchandising enterprise operating in a highly competitive field."

It does not seem to me that the pharmacists who oppose the excessive commercialization which has occurred in many retail pharmacies should have their antagonisms aroused by such a statement at the very start of a book on accounting. Physicians are being supplied today with simplified record-keeping systems by which they can readily determine their income tax liability. Certainly no one contends that the use by physicians of accounting systems of this type is in any way a commercialization of the practice of medicine.

Likewise, the proper accounting records in a retail pharmacy are in no way related to the degree of commercialization that may exist in a particular pharmacy.

PAUL C. OLSEN.

The Reichert Collection, Illustrative of the Evolution and Development of Diagnostic Instruments and Techniques in Medicine. A Handbook. 1942. 70 pages. Illustrations. Wellcome Exhibition Galleries, 11 East 41st Street, New York.

This booklet serves as a handbook to a collection of diagnostic instruments assembled by Philip Reichert, A.B., M.D., F.A.C.P., and is now on view as a loan exhibit at the Wellcome Exhibition Galleries. It has been assembled for the purpose of using it as a reference laboratory by investigators interested in the field of methods and apparatus.

The handbook, of course, is designed primarily as a guide to the study of the objects in the collection. The scope of the booklet is indicated by the titles of its various sections: Sphygmography. Sphygmomanometry, Auscultation, Microscopy, and Endoscopy.

The handbook is of value in this particular field since its detail in tracing the evolution of diagnostic instruments completely covers a comprehensive and unique collection of instruments.

The handbook is complimentary to members of the medical and allied professions.

M. O. HOLLAND.

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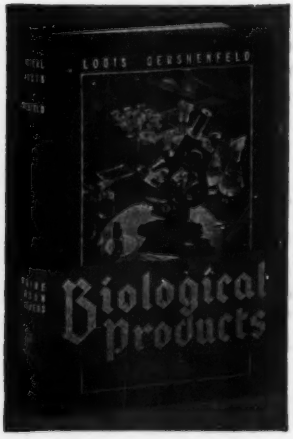

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